

## 课程详述

### COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	课程名称 <b>Course Title</b>	环境微生物学 <b>Environmental Microbiology</b>				
2.	授课院系 <b>Originating Department</b>	环境科学与工程 School of Environmental Science and Engineering				
3.	课程编号 <b>Course Code</b>	ESE301				
4.	课程学分 <b>Credit Value</b>	3				
5.	课程类别 <b>Course Type</b>	专业核心课 Major Core Courses				
6.	授课学期 <b>Semester</b>	秋季 Fall				
7.	授课语言 <b>Teaching Language</b>	中英双语 English & Chinese				
8.	授课教师、所属学系、联系方式 (如属团队授课, 请列明其他授课教师) <b>Instructor(s), Affiliation &amp; Contact</b> (For team teaching, please list all instructors)	<b>教师 Name</b>	<b>学系 Department</b>	<b>联系方式 Phone</b>		
		夏雨 XIA Yu	环境科学与工程学院 School of Environmental Science and Engineering	手机: 14715025437		
9.	实验员/助教、所属学系、联系方式 <b>Tutor/TA(s), Contact</b>	待公布 To be announced				
10.	选课人数限额(可不填) <b>Maximum Enrolment (Optional)</b>					
11.	授课方式 <b>Delivery Method</b>	讲授 <b>Lectures</b>	习题/辅导/讨论 <b>Tutorials</b>	实验/实习 <b>Lab/Practical</b>	其它(请具体注明) <b>Other (Please specify)</b>	总学时 <b>Total</b>
	学时数 <b>Credit Hours</b>	44	4	0		48

12. 先修课程、其它学习要求 <b>Pre-requisites or Other Academic Requirements</b>	先修课 Pre-requisites: 生命科学概论 Introduction to Life Science
13. 后续课程、其它学习规划 <b>Courses for which this course is a pre-requisite</b>	水处理工程/Water Treatment Engineering
14. 其它要求修读本课程的学系 <b>Cross-listing Dept.</b>	无 N/A

**教学大纲及教学日历 SYLLABUS**

15. **教学目标 Course Objectives**

This course mainly covers the study of microbe in such aspects as its classification and form structure, nutrients and growth, metabolism, inheritance and variance, ecosystem as well as the application of microbial treatment in biodegradation and transformation for pollutants, aiming to help students master the principles and methods of treating the environmental pollution and purify the environment with microbial technology. Additionally, students will be instructed with basic knowledge of microbe observation, cultivation, domestication and separation used for the treatment of environmental pollution so as to develop a new efficient microbiological species. This course lays a solid theory foundation and cultivates students' competence of practice in this field.

本课程主要涉及微生物的分类、形态结构、营养与生长代谢、遗传与变异、生态系统，以及微生物处理技术在污染物生物降解与转化中的应用等方面的学习，旨在帮助学生掌握利用微生物技术净化环境、治理环境污染的原则和方法。学生也将学习观察、驯化、分离环境中的微生物以及培养新型高效微生物菌种等方面的基本知识。本课程为环境科学与工程学科中微生物相关的理论和实践能力奠定基础。

16. **预达学习成果 Learning Outcomes**

After this course, students should know the general development of environmental microbiology, grasp basic concepts of environmental microbiology and basic theories of microbiological application. This course lays a basis for students to take advanced courses in environmental science and engineering, such as Water Treatment Engineering, Soil and Groundwater Contamination.

通过本门课程的学习，学生应该掌握：

- (1) 环境微生物学领域的基础知识
- (2) 掌握微生物代谢的生物化学原理及其在日常生活中的应用
- (3) 微生物在地球化学循环中的作用
- (4) 污染物生物处理的基本原理及前沿发展，为后续学习水处理工程奠定知识基础

17. **课程内容及教学日历**（如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人）  
**Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)**

Course Contents (总 48 学时)

Chapter 1. General introduction to environmental microbiology 介绍 (小计: 2 学时)

- (1) The development of environmental microbiology globally (1 学时)
- (2) The objective, content and requirements of this course (1 学时)

Chapter 2. Microbes in the environment (小计: 11 学时)

- 2.1 The structure of microbiology and the relationship with environment (1 学时)  
微生物结构, 分类及其与环境的关系
- 2.2 Cellular structure of microorganisms 微生物的细胞结构特征 (4 学时)
  - 2.2.1 Bacteria 细菌)
  - 2.2.2 Archaea 古菌, Ctinomycetes 放线菌、Eukaryotes 真核微生物、Virus 病毒
- 2.3 The cultivation、isolation and storage of microorganisms (4 学时)  
微生物的培养和分离和菌种保藏
- 2.4 Microscopic observation of microorganisms (2 学时)  
微生物的显微镜观察

Chapter 3. Metabolism of microorganisms 微生物的营养代谢 (小计 10 学时)

- 3.1 Chemical composition of cell and microbial nutrition (2 学时)
- 3.2 Microbial Metabolism 微生物的产能代谢 (6 学时)
  - 3.2.1 Cellular respiration 有氧呼吸
  - 3.2.2 Fermentation
  - 3.2.3 Autotrophic metabolism
- 3.3 Microbial Growth 微生物的生长繁殖 (2 学时)

Chapter 4. Micromolecules and Molecular genetics 微生物的遗传与变异 (小计 3 学时)

- 4.1 molecular basis for microbial genetics 微生物的遗传物质基础 (2.5 学时)
- 4.2 DNA replication and repair (0.5 学时)

Chapter 5. Microbes in environmental material cycle 微生物在自然物质循环中的作用 (小计 3 学时)

- 5.1 Microbial carbon cycle (1 学时)
- 5.2 Microbial nitrogen cycle (1 学时)
- 5.3 Microbial sulphur cycle (1 学时)

Chapter 6. Environmental application of microbial processes 微生物学在环境领域的应用 (小计 3 学时)

- 6.1 Biological wastewater treatment (2 学时)
- 6.2 The remediation effect of microbiology (0.5 学时)
- 6.3 Microbiological methods application on environmental monitoring (0.5 学时)

The other 12 class hours are used for in class presentation and group discussion and another 4 class hours are used for two tutorial sessions.

Total: 48 class hours

NO.	Content	Hours				Sub-total
		Lectures	Tutorials	Lab/Practical	Other	
1	General introduction of Environmental microbiology	2				2
2	Microbes in the environment	11				11
3	Metabolism of microorganisms	10				10
4	Micromolecules and Molecular genetics	3				3
5	Microbes in environmental material cycle	3				3
6	Environmental application of microbial processes	3				3
7	Presentation	12				12
8	Tutorial		4			4
Total		44	4			48

18. 教材及其它参考资料 **Textbook and Supplementary Readings**

[1] Environmental Microbiology (Third Edition), 2014, Ian L. Pepper (编者), Charles P. Gerba (编者), Terry J. Gentry (编者), Academic Press, ISBN: 0123946263

[2] 生态及环境微生物学:英文(导读版), Thomax M.Schmidt, Moselio Schaechter, 2012, 科学出版社, ISBN: 9787030342928

[3] 环境微生物学, 乐毅全, 王士芬, 2011, 化学工业出版社, ISBN: 9787122109378

[4] 环境微生物学, 任何军, 张婷娣, 2015, 清华大学出版社, ISBN: 978730242064-4

**课程评估 ASSESSMENT**

19. 评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance	The entire semester	5%		
课堂表现 Class Performance	The entire semester	5%		
小测验 Quiz				
课程项目 Projects	Last week	20%		
平时作业 Assignments	The entire semester	10%		
期中考试 Mid-Term Test	Midterm	20%		闭卷考试 closed-book exam
期末考试 Final Exam		40%		闭卷考试 closed-book exam
期末报告 Final				

**Presentation**

其它（可根据需要  
改写以上评估方  
式）

**Others (The  
above may be  
modified as  
necessary)**


20. 记分方式 **GRADING SYSTEM**

- A. 十三级等级制 **Letter Grading**  
 B. 二级记分制（通过/不通过） **Pass/Fail Grading**

**课程审批 REVIEW AND APPROVAL**

21. 本课程设置已经过以下责任人/委员会审议通过

**This Course has been approved by the following person or committee of authority**

